File 649

25X1

May 22, 1961

25X1

MONTHLY REPORTS 1 THRU E140

FINAL, 17 JUNE 60 TO 16 MAY 61

25X1

Subject: Monthly Report on Project E140 - Final

Gentlemen:

This letter constitutes the final monthly report on the subject project and covers the work done during the period April 17 to May 16, 1961.

All construction and testing of the variable speed drive and modulator playback system has been completed. The second Gemisco motor was received during the first part of May so that the work could be completed within the time allowed. The first Gemisco motor received had 0.7 mil runout on the capstan shaft. This amount of runout would cause excessive wow and flutter. To save time and circumvent the possibilities of further damage in shipment, the motor was disassembled and the shaft reground in the Foundation's shop. Upon assembly of the motor the runout was so small it could no longer be measured.

The necessary photographs have been taken and the final tests have been run. The instruction manual has been written and only final typing and preparation of the figures for reproduction remains to be done. It is expected that the complete instruction manual can be sent out on the week of June 5, 1961.

The instruction manual consists of a complete description of the motor drive system and the modulator playback system including block diagrams, schematic diagrams, photographs, voltage-resistance charts, description of the principal of operation, operation and maintenance instructions. The equipment will be shipped along with a preliminary rough draft copy of the instruction manual during the week of May 22nd. Every effort will be made to get the final instruction manual out as soon as possible.

25X1

Very truly yours,

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Electronics Research

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CONFIDENTIAL

[redacted] 25X1

April 25, 1961

[redacted] 25X1

Subject: Monthly Report No. 10 on Project E140

Gentlemen:

This letter constitutes the tenth monthly report on the subject project and covers the work done during the period March 17 to April 16.

As described in the previous report fabrication of the modulator playback heads and associated electronics has been completed. Some component labeling has yet to be done. Work on modification of the tape transport has been delayed due to rescheduled delivery of the Genisco motors.

Genisco proposed, as related in the last report, to deliver one motor on 3/30/61 and the second on 4/12/61. The first motor was received on 4/19/61 and as yet the second one has not been delivered. Modification of the Ampex Model 350 transport was started immediately upon receiving the first motor. Motor characteristics are now being measured and considered for selection of suitable power amplifier driving sources. Three identical power amplifiers will be used. A General Radio Model 1305A low frequency 3-phase oscillator has been purchased and will be used to drive the amplifiers.

After the complete system is assembled the frequency versus tape speed characteristics will be determined and the Instruction Manual completed. If the second Genisco motor is delivered within a reasonable time and if the power amplifiers selected are readily available the equipment will be ready for shipment as anticipated. In the event that there are additional delays in receiving components, or unanticipated problems in regard to performance of the Genisco motors, additional time may be required to complete the program.

Very truly yours,

[redacted] 25X1

Electronics Research

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25X1

March 22, 1961

E 140

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Subject: Monthly Report No. 9 on Project E 140

Gentlemen:

This letter constitutes the ninth monthly report on the subject project and covers the work done during the period February 17, 1961 to March 17, 1961.

Fabrication and testing of both dual channel modulator playback heads has been completed. As previously described, it was necessary to redesign the heads because of the increased frequency range over which they are to function. The increased frequency range results from the change of scope of work to include modification of the Ampex Model 350 to provide for operation over a tape speed range from 0.06 to 7.5 IPS. The modified dual channel modulator heads are made up of four-mil Supermalloy laminated pole pieces and half-mil laminated saturable elements.

Design, fabrication, and testing has also been completed on the dual-channel modulator playback electronic auxiliaries, with the exception that some component labeling has yet to be done. Test results, in a preliminary fashion, are given with this report; complete descriptions of test procedures and results are being prepared as part of the instruction manual. During the past reporting period much work has been done on the instruction manual.

Modification of the Ampex Model 350 tape transport mechanism has not been started as yet. On the 15th of this month, a Western Union telegram was received from Genisco, the motor supplier. The telegram stated: "Development and procurement problems relative to gears and bearings necessitate rescheduling delivery. Request your concurrence in use of AGMA precision class two gears in lieu of nylon cushion gears due to design problems with latter. --- Rescheduled delivery as follows: one motor 3/30/61, one motor and gear box 4/12/61."

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Since difficulty has been encountered causing delay in delivery and since [redacted] has designed and fabricated a gear box which has been used in a similar application and proved successful, a change order has been issued eliminating the purchase of a gear box from Genisco. Two Genisco motors will be used to provide variable tape speed over a range from 0.06 to 7.5 IPS in two steps; one range 0.06 to 1.0 IPS using the ARF built worm gear drive and the other, 1.0 to 7.5 IPS direct drive, a Genisco motor shaft being the capstan. 25X1

During the next reporting period, labeling of components will be completed and resistance and voltage charts will be made. Modification of the transport will be started just as soon as the Genisco motors are received.

Very truly yours,

[redacted] 25X1

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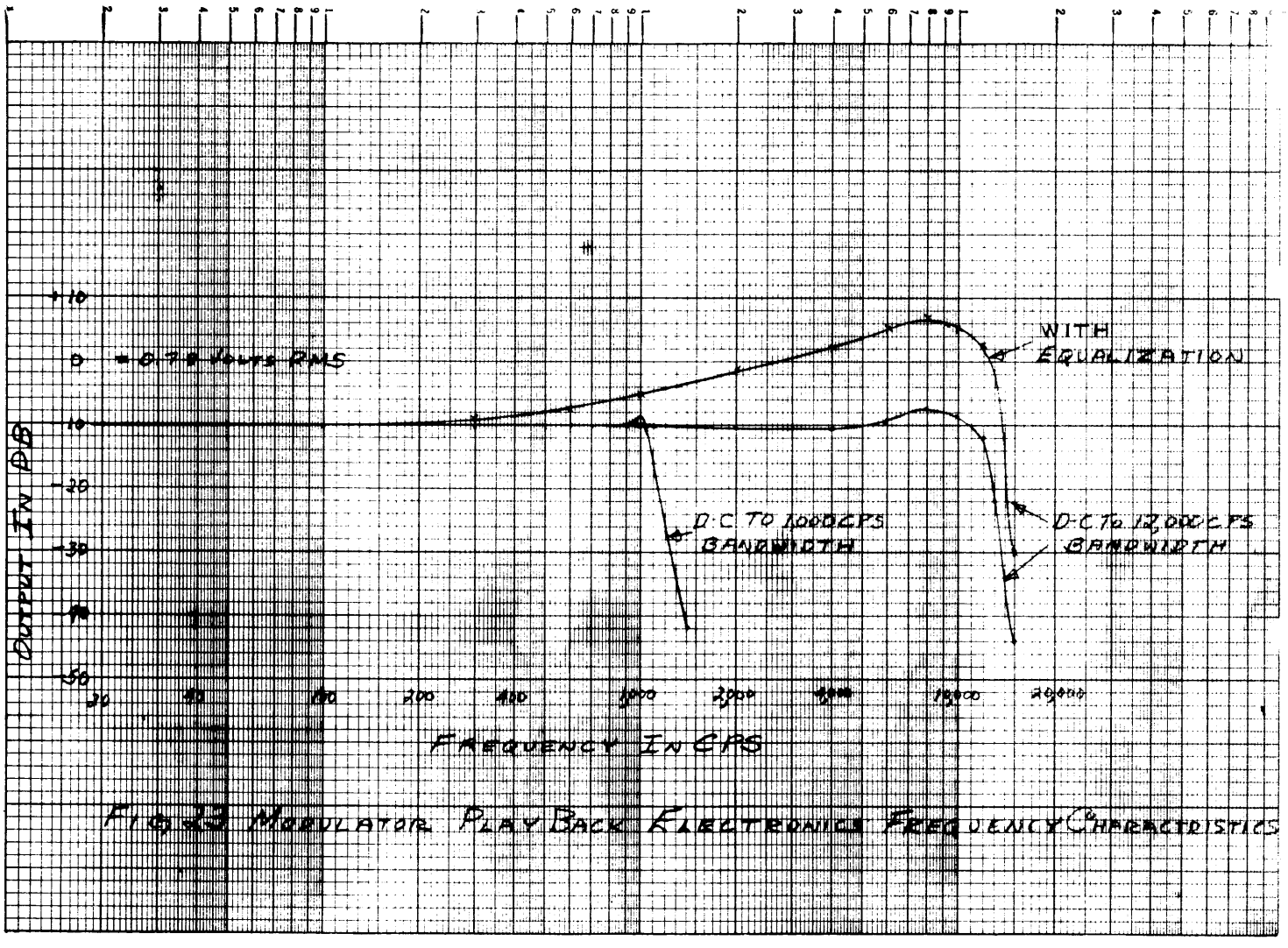

Fig 33 Modulator Play Back Electronics Frequency Characteristics

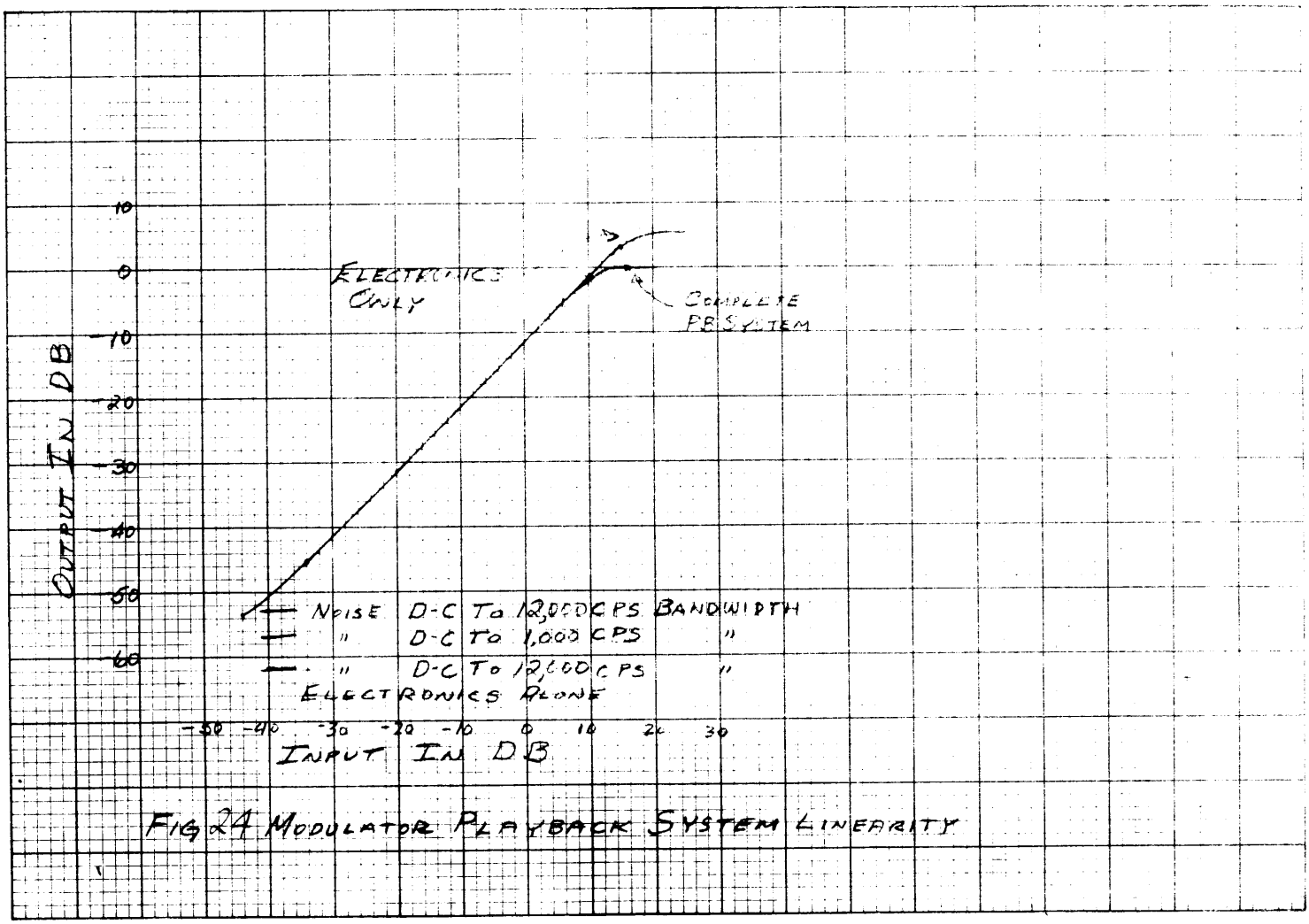

FIG 24 MODULATOR PLAYBACK SYSTEM LINEARITY

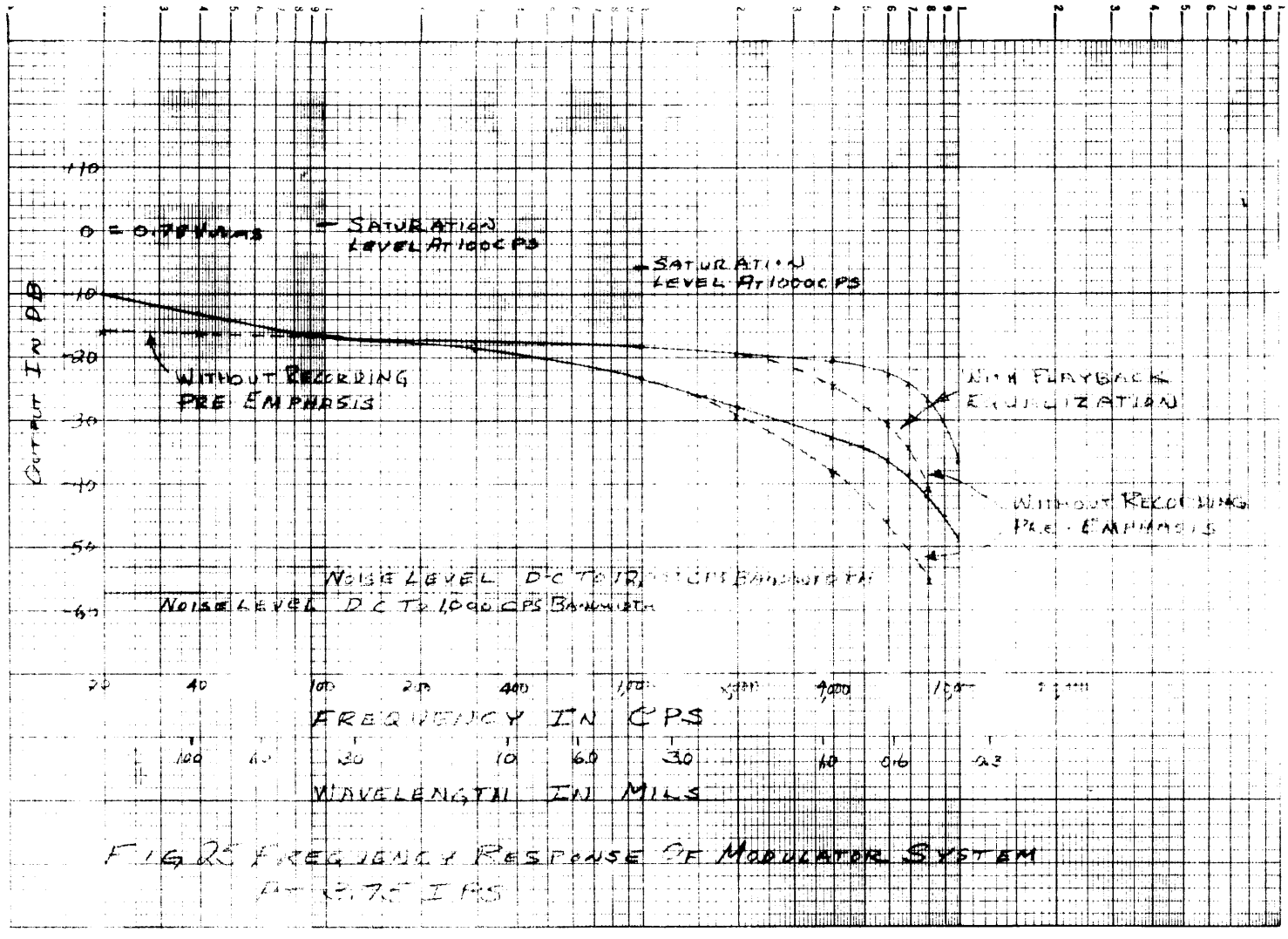

FIGURE FREQUENCY RESPONSE OF MODULATOR SYSTEM AT 7.5 IPS

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[redacted]

February 24, 1961

E140

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[redacted]

Subject: Monthly Report No. 8 on Project E140

Gentlemen:

As previously described, the modulator heads which had been designed and fabricated and the electronic auxiliaries which had been designed had to be redesigned because of the change in scope on the subject program. The new specifications call for modification of the Ampex model 350 tape transport for variable tape speed operation, the speed range to be 0.06 to 7.5 IPS. The dual channel modulator playback heads must be capable of reading tape at speeds in this range where the frequency range is zero to 12 Kc. Similarly, the electronic auxiliaries must have this frequency range capability.

Genisco Hyspersin motors have been ordered for modification of the transport. Genisco has promised to deliver the motors by the end of February.

To accommodate the frequency range of zero to 12 Kc the modulator heads were modified. Originally the upper frequency limit was 100 cps, and therefore, the heads were constructed with solid pole pieces. When playback of frequencies of over one or two kilocycles is required it is necessary to laminate the pole shoes. The dual channel modulator head has been modified, replacing the solid with laminated pole pieces. Laminations of 0.004 inch Supermalloy were used in the new pole pieces.

The electronic auxiliaries have also been redesigned. This includes the excitation oscillator now operating at 135 Kc, the second harmonic signal amplifier, center frequency 270 Kc with a 22 Kc bandwidth, a reference amplifier, a ring demodulator, and an output d-c amplifier. A single channel has been completed and tested. During the following reporting period, the remaining work to be done on the chassis will be completed.

Preliminary tests on the head and electronics were made to determine frequency response, linearity, signal-to-noise ratio and crosstalk characteristics. The head was mounted in the playback head shield on the Ampex model 350 transport mechanism. Operating the transport at 3.75 IPS the frequency response of a recording made at zero db as read on the recorder V U meter ranged from zero db at 100 cps to minus 14 db at 6250 cps and minus 25 db at 10 Kc. The noise with respect to this signal level was minus 36 db. The signal-to-noise ratio as related to a saturated signal (100 cps recorded at a level which gives 20 per cent total harmonic distortion) was 52 db. The channel-to-channel crosstalk appears to be virtually non-existent; i.e., was not measurable. This is apparently due to the increased laminated shielding. System linearity is within the limitations of the instrument accuracy used in the experiment. The dynamic range of the electronics alone is greater than 70 db. Including the effect of modulator head noise, system dynamic range is 56 db. The system dynamic range is reduced to 52 db as indicated before when the tape saturation limit is taken into account.

To attain a flat response, equalization can be employed; however, equalization circuits are dependent on frequency so that proper equalization can be provided only at specific tape speeds. Unless otherwise instructed, equalization will be provided for operation at 0.06 and 3.75 IPS. The equalization circuits as well as the 1000 cps and 12 Kc low pass output filters can be switched in or out of the circuits from the front panel as needed.

During the next period construction of the second head will be completed as well as the electronic auxiliaries. Modification of the transport will also start if the Genisco motor is delivered on schedule.

Very truly yours,

[redacted] STAT
or
Electronics Research

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[redacted]

January 25, 1961

E140

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[redacted]

Subject: Monthly Report No. 7 on Project E140

Gentlemen:

This letter constitutes the seventh monthly report on the subject project and covers the work done during the period December 17, 1960 to January 16, 1961.

During this period the clamp-on device and the associated amplifier was delivered. Some difficulties were encountered in the mechanical construction of the clamp-on devices due to heating of the Hall effect element as the potting compound cured. We were, therefore, successful in making only one current probe. Now that the problem area has been ascertained, we believe that we may be able to deliver an additional clamp-on probe with a larger diameter for your use. Because of the time required to obtain the material it will take approximately one month to deliver the additional probe.

During the past month application of a Genisco motor to the Ampex tape transport has been pursued. After firm specifications were given to Genisco as to speed range, capstan size, output shaft torque and stability, Genisco proposed that a Hyspersin motor be used rather than the differential motor as previously considered. In their recommendation they said, "The differential motor we manufacture may not be quite as accurate in regards to absolute synchrononism as one variable frequency Hyspersin motor would be. Therefore, we ask you to consider the following. One variable frequency Hyspersin motor based on our Model 5109 which is basically a 12-pole 2400 rpm motor suitable for an input frequency of 9 to 1200 cycles. This motor would have an inbuilt gear reduction of 10 to 1 to reduce the variable speed to 9 to 1200 rpm. Without the gear reduction the variable frequency source would have to go down to 0.9 of a cycle, and while this is possible electronically, the motor performance would not be good at this point."

"The gears we would propose supplying would have an integral nylon "cushion" which would entirely eliminate any potential backlash. We have used these gears on similar applications where absolute accuracy was demanded."

Considering that they proposed using a motor that runs as high as 12,000 rpm the life expectancy of the unit was questioned. Their answer: "We would anticipate a bearing and gearbox life of approximately 1,000 hours at 12,000 rpm."

During the month [redacted] on the way to the East Coast to further discuss and describe the motor and auxiliaries Gensico proposed for the variable speed drive. STAT

The use of a 10:1 gear ratio is still questionable since the pitch diameter is relatively small and the gear-to-gear driving point changes causing a slight variation in driving radius which in turn will cause small variations in the output shaft speed which may be sufficiently large to cause objectionable flutter. If this be the case, the worm gear reducer which was an integral part of the first proposed system and which is partially completed will be assembled and used in place of the 10:1 gear reducer supplied by Genisco. The use of this gear box, however, will require two variable speed motors one to cover the range from 810 rpm (0.6 IPS) to 12,000 rpm (0.88 IPS) and the other from 133 rpm (0.88 IPS) to 1200 (7.5 IPS) rpm or higher; for instance, 2400 rpm would give 15 IPS.

With these considerations and possibilities in mind, two motors were ordered, one with a 10:1 ratio gear reducer attached. Delivery of these items was promised within eight weeks.

To attain response during playback of signal up to 12 Kc a wider bandwidth is required, so an IF amplifier to operate at 455 Kc, an associated 227.5 Kc oscillator, and detector circuits, are being designed, constructed and tested.

The electronics required for driving the three phase variable speed capstan motor will be selected and purchased during the next month. Further, rework of the playback heads for operation at higher frequencies will be started during the next month.

Very truly yours,

[redacted] STAT
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Electronics Research

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December 19, 1960

E 140

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Subject: Monthly Report No. 6 on Project E 140

Gentlemen:

This letter constitutes the sixth monthly report on the subject project and covers the work done during the period November 17, 1960 to December 16, 1960.

The missing part for the second main unit has been obtained, and the unit is now being tested. An additional unit to accompany the clamp-on device has also been constructed. The unit consists of a transistor amplifier which provides nominal gains of 60,000, 6,000 or 600, and a 400 to 3,000 cycles per second band pass filter.

The design of the clamp-on device has been concluded and actual assembly of the clamp is being completed. The device consists of a one mil thick Hall element mounted in an air gap of a toroid of H-type material. The toroid is potted in a Scotch-cast material to provide strength and greater ease of handling. Currents of the order of ten microamperes at 1.1 S/N have been detected with such a device. Two clamp-on devices, accompanied by the additional amplifier-filter unit, will be shipped together with the second main unit by the end of this month.

Because of the great versatility of a variable speed magnetic tape transport drive system in data analysis work, the scope of the present project has been changed. Initially the development called for modification of an Ampex tape transport (Model 350) for reduced tape speed operation (0.06 IPS). The possibilities of obtaining a unit from STAT capable of operating at low speeds as well as higher speeds by use of a differential motor capstan drive brought to light the possibility of continuously variable speed operation. Since this system, in its early developmental stages, as demonstrated by STAT did not appear promising for the immediate sponsor needs, an alternate approach was proposed.

This approach, does not include a continuously variable speed drive; however, it does make possible operation at four fixed tape speeds, i.e., 7.5, 3.75, 0.12 and 0.06 IPS. Since this was proposed in the last report the sponsor has indicated a preference in pursuing further the approach involving a continuously variable speed capstan drive.

The following modification to the Ampex transport mechanism is therefore proposed. Variable speed operation over a range from 7.5 IPS to 0.5 IPS or possibly all the way down to 0.06 IPS can be attained by replacing the standard Ampex capstan motor with a differential Supersyn or Hyspersyn motor designed by Genisco Incorporated. The differential motor proposed by Mr. [redacted] for this application consists of possibly as many as 24 poles on each stator as compared to 4 poles in the Stancil-Hoffman differential motor. The large number of poles greatly reduces the amount of inherent hunting. In the event smooth operation at the slow speed is not attained directly, the worm gear drive system previously considered driven by a variable speed motor can be used for the range of speeds from 0.060 IPS to 0.5 IPS. The worm gear drive system, however, will not be incorporated into the Ampex modifications unless the single variable speed capstan drive motor, after thorough testing, is found to be inadequate for smooth performance at the very slow speeds. It is hoped that the Genisco differential motor will be adequate and that the worm gear system need not be used. Construction on the worm gear drive, since it had already been started, will be completed and will be ready in the event it is needed. STAT

As soon as data is available on the Genisco motor characteristics, design and fabrication or purchase of suitable frequency sources and motor driving power amplifiers will begin.

Initially the modulator playback amplifiers were designed with a bandwidth of less than 1500 CPS considering the restricted bandwidth (0 to 150 CPS) necessary for playback at 0.06 IPS. However, now it appears that frequencies ranging up to 12 KC during playback at 7.5 IPS would be desirable (for the variable tape speed system). A higher frequency excitation source and a second harmonic IF amplifier circuit for wider bandwidth operation will be designed and breadboarded.

After the higher frequency wide band electronics are fabricated and checked out, the performance of the modulator heads will be checked at 7.5 IPS. Since the pole pieces were not laminated with fine, 0.002 or 0.004 inch material, operation at the higher frequencies, 5 to 10 KC, may be inadequate. New laminations will then be made and installed in the existing head structures.

As described in a recent telephone conversation with the sponsor, additional time, for the changes in scope, will be necessary mainly because of delivery time required for purchased equipment, i.e., Genisco differential motor, power amplifiers, etc. Also, it is anticipated that additional funds will be needed for purchase of the equipment described and for expenses incurred in additional technician time.

To summarize the technical objectives of the program at its present state, the following activities are proposed and planned:

1. Investigate, acquire and incorporate Genisco motor to provide any choice of tape speed in the range of 7.5 to 0.5 IPS and, if possible, down to 0.06 IPS.

2. Purchase, or design and construct oscillator-power amplifiers necessary to drive the Genisco differential motor.

3. Completion of worm gear drive system to assure that satisfactory operation at 0.06 IPS. (This unit will not be used in the final system if the Genisco motor has adequate low speed performance; since low speed performance is not assured, the worm gear drive system is a necessary back-up to meet the original 0.06 IPS objective.)

4. Rework playback heads and electronics to accommodate higher frequencies associated with wide speed range tape drive.

A proposal for this additional activity is being submitted under separate cover.

Very truly yours,

[redacted] STAT

Assistant Director
Electronics Research

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[redacted]

November 22, 1960

E 140

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[redacted]

Subject: Monthly Report No. 5 on Project E 140

Gentlemen:

This letter constitutes the fifth monthly report on the subject project and covers the work done during the period October 17, 1960 to November 16, 1960.

Four Hall-effect probes and one main unit have been completed and shipped. Another main unit was constructed except for one part which should be obtained shortly. As soon as it is received the unit will be tested and shipped.

The design of the clamp-on device was continued. Utilizing toroids of H-type material (relative permeability of 850) and Hall elements 0.0006 inch thick, sensitivities of 25 microvolt per milliampere were obtained.

During the next monthly period the design of the clamp-on will be continued to determine the effects of the gaps due to cutting open the toroids. Also, the actual assembly of the clamp will be designed and constructed.

On November 15th a visit to the [redacted] in Los Angeles, California was made to observe a demonstration of and to perform tests on the differential (counter-rotating) motor capstan drive system. As previously discussed, the [redacted] differential motor is being considered as a means of obtaining the low tape speed, 0.060 IPS, with low wow and flutter and the facility to increase tape speed up to as high as 60 IPS thereby providing maximum flexibility of the transport mechanism.

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Preliminary measurements of wow and flutter characteristics on the Stancil-Hoffman machine operating at about 0.1 IPS were in the range of 10 to 15 per cent. The general performance of the system was not impressive. It appears quite unlikely that the wow and flutter characteristics can be reduced by any significant amount, since the inertia of the

output shaft is practically zero and only four pole windings are used. The motor consists of a stationary outside stator (with a four pole winding) an inside rotating stator (which also has a four pole winding) on the output shaft with an intermediate dual rotor. With the two windings excited with nearly the same frequency, as is the case when operating at 0.06 IPS, the output shaft, on which the inside stator is mounted, rotates at about 4 RPM. With only four poles it appears that there is room for an appreciable amount of hunting to occur while remaining in synchronism. It was also apparent that the control and power source circuitry requires major redesign before the system could be used as a tool in the laboratory. We therefore feel that it would be unwise to pursue, any further, or employ the [redacted] counter rotating motor system in this application. STAT

The Ampex 350, therefore, will be modified as previously planned. The drive capstan motor will not be removed. The low speed drive mechanism now being designed will be coupled to the drive capstan through a clutch. When disengaged the transport can be operated at the two normal tape speeds, (3 3/4, 7 1/2 IPS). This work has been initiated and the transport is expected to be assembled and ready for preliminary test in approximately six weeks.

Fabrication of the magnetic modulator heads has been completed. Initial tests will soon be performed to check their characteristics. Design of the electronics is progressing and fabrication is expected to follow within the next month.

Very truly yours,

[redacted] STAT

Assistant Director
Electronics Research

SIC:pm

File 0147

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[redacted]

October 24, 1960

E 140

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[redacted]

Subject: Monthly Report No. 4 on Project E 140

Gentlemen:

This letter constitutes the fourth monthly report on the subject project and covers the work done during the period September 17, 1960 to October 16, 1960.

The construction of four Hall-effect sensors, two amplifiers and one calibrator was completed. Due to a delay in obtaining materials, the construction of the other calibrator was postponed.

Preliminary tests in the design of a clamp-on Hall-effect sensor were performed. Results of these tests indicate that the sensitivity of the device is at least one order of magnitude lower than is required. Additional tests with better magnetic materials should give an improvement in sensitivity.

During the next monthly period the construction and testing of the entire system of Hall-effect magnetometers for audio range should be completed and delivered. The development of the clamp-on sensor will be continued. The auxiliary equipment for the clamp-on sensor will be designed.

As previously discussed, the [redacted] counter-rotating motor for low speed operation of the Capstan drive is being considered; either as applied to the Ampex 350 or as used in the more versatile Stancil-Hoffman mechanism. Mr. [redacted] indicated, by phone October 18, a demonstration of the system operating at 0.06 IPS will be made as soon as the necessary drive oscillator is built. A twin-T filter tuned to about 40 CPS will be employed to determine the amount of wow and flutter. Another demonstration of significance to be made is observation of the shaft when both field windings of the counter-rotating motor are excited from the same frequency source. In this condition the Capstan shaft should be at a standstill. Any jitter or movement will be an indication of the wow and

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flutter to be expected at low speed operation; i.e., when the two field windings are excited by slightly different frequencies. A meeting with [redacted] in California during the month of November will be arranged so that the tests and demonstration can be carried out. STAT

Fabrication of the magnetic modulator head is nearly complete. The spare head has not as yet been started. The head is designed to mount in the Ampex playback head magnetic shield. If the [redacted] transport is suitable for the application and is preferred over modification of the Ampex transport, it is believed the head mounting arrangement can be modified to suit the S-H transport. STAT

During the next reporting period, fabrication on the first head will be completed and tests will be made to determine compliance with the specified requirements. Sponsor representatives will be notified of the arrangements for demonstration of the Stancil-Hoffman unit as soon as they are made.

Very truly yours,

[redacted] STAT

Assistant Director
Electronics Research

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Remarks:

3-rd Progress Report
on Magnetometers, Current Clamp
and Modulator Heads
Steering Committee Members

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FROM: NAME, ADDRESS AND PHONE NO.		DATE
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FORM NO. 237 1 APR 55 Replaces Form 30-4 which may be used. (40)

U. S. GOVERNMENT PRINTING OFFICE : 1955—O-342531

File

STAT

September 21, 1960

E 140

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Subject: Monthly Report No. 3 on Project E 140

Gentlemen:

This letter constitutes the third monthly report on the subject project and covers the work done during the period August 17, 1960 to September 16, 1960.

During the past monthly interval a Steering Committee Meeting was held. Discussed were the design specifications for the two magnetometers to measure alternating magnetic fields. The frequency response characteristics were changed from the original range of 5 to 50 cycles per second to a range of 5 to 17,000 cycles per second. A dynamic range of one hundred was required at each setting of the amplifier, with the facility to measure fields from one microgauss to one hundred gauss. The output of the amplifier will provide a connection directly to an oscilloscope or magnetic tape recorder. It was also agreed that delivery will be delayed from the 1st to the 22nd of October due to the change in specifications and delay in obtaining materials.

Changes in the design of the amplifier have been completed and construction has been initiated. The amplifier will have a maximum gain of approximately 100,000. A seven step attenuator will be a major design feature to accommodate all ranges of magnetic field from one microgauss to one hundred gauss. Construction of a calibrator is being initiated. The Hall sensors are at present being fabricated.

Design of the dual-channel magnetic modulator playback head has been completed. Presently the head is being fabricated and it is expected that the head will be available for preliminary tests within the next reporting period. Design and testing of the modulator playback electronics has progressed and is ready for tests as a complete system with the modulator head.

As described in the last report, consideration is being given to the possibilities of using the composite counter-rotating capstan drive motor designed and fabricated by the [redacted] on the Ampex machine to obtain operation at 0.06 IPS. During a recent trip to the West Coast the [redacted] was visited and the applicability of the counter-rotating motor to the Ampex machine for low speed operation was discussed.

[redacted] said the wow and flutter measurement made on the prototype transport mechanism at 1 7/8 IPS using the counter-rotating motor was about 0.2 percent rms. This is very encouraging. Up to that time, however, operation at a lower speed had not been tried so it is difficult to estimate the wow and flutter at 0.06 IPS. [redacted] indicated the system would be set up for operation at 0.06 IPS so that measurements of wow and flutter could be made. It is expected that this will be done within the next month. A trip out to the Coast to observe the tests on the system operating at 0.06 is planned. As discussed in the recent Steering Committee Meeting, the sponsor will be notified of the plans so that a representative of the sponsor can be present if desired.

If the tests prove to be successful, it is believed that it may be more advisable to purchase the entire [redacted] transport and control system rather than adapting the counter-rotating motor to the Ampex machine. In either case, if the counter-rotating motor is used, the mechanism will be much more versatile since it will be possible to operate the mechanism at any speed from 30 IPS on down to 0.06 IPS.

Very truly yours,

[redacted]

Assistant Director
Electronics Research

SIC:pm

STAT

August 17, 1960

E 140

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Subject: Monthly Report No. 2 on Project E 140

Gentlemen:

This letter constitutes the second monthly report on the subject project and covers the work done during the period July 17, 1960 to August 16, 1960.

The details of the design of the Hall-effect sensors were determined. The probes were designed in such a way as to provide two sensors in space quadrature. The design of the amplifiers and calibrators has been completed.

During the next monthly period, the sensors, amplifiers and calibrators will be constructed and tested.

During the past month, the Ampex Model 350 magnetic tape transport mechanism and associated equipment was received. As a result, design of the dual-track magnetic modulator playback head has started.

Specifications for fabrication of the dual track magnetic modulator playback head call for in-line gaps with standard track width of 0.050 inch and spacing of 0.140 inch. The head will be designed so that the existing playback head shield and mounting arrangement can be used.

Preliminary designs of the excitation oscillator and IF type amplifier circuits have been built and are presently being tested. The excitation oscillator is capable of supplying from 0.1 to over 0.5 amperes at 131 KC. The frequency of 131 KC was chosen because a band pass at the second harmonic, 262 KC of 1.5 KC can be attained with high quality commercial IF transformers and components. Of particular importance in the design of the excitation oscillator is minimization of the second harmonic content because any second harmonic signal originating in the oscillator and appearing in the output will reduce the dynamic range of the system. A push-pull oscillator and drive circuit has been built and is now being tested.

A new and promising approach to modification of the Ampex Model 350 for 0.06 IPS operation is being considered. The Stancil-Hoffman Company is presently involved in the development of a composited counter rotating motor to obtain smooth capstan drive at any speed down to zero IPS. The composite motor actually consists of two counter rotating synchronous motors coaxially arranged; one motor operating at 60 cps and the other driven at a different frequency in the opposite direction thereby giving a fixed slow speed on the output shaft.

During the next period, the counter-rotating capstan drive system will be evaluated. Head design will be completed at which time head fabrication will start. Work on the electronic circuitry will continue.

Very truly yours,

[redacted] STAT

Assistant Director
Electronics Research

SIC:pm

File E 649

25X1

[redacted]

July 25, 1960

E 140

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[redacted]

Subject: Monthly Report No. 1 on Project E 140

Gentlemen:

This letter constitutes the first monthly report on the subject project and covers the work done during the period June 17, 1960 to July 16, 1960.

The design of hall-effect magnetic-field sensors has been initiated. Specifically, the requirements of the amplifiers and calibration were determined. The calibration was set at 1000 cps so as not to interfere with any measured magnetic fields.

During the next monthly period, the details of the amplifier and calibration will be determined. Also, the construction of the sensors will be initiated.

Very truly yours,

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[redacted]

Assistant Director of
Electrical Engineering Research

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RESEARCH FOR INDUSTRY